

Terrestrial isopod crustaceans from Daito Islands, southern Japan

journal or publication title	Bulletin of the Toyama Science Museum
number	32
page range	75-87
year	2009-02-25
URL	http://repo.tsm.toyama.toyama.jp/?action=repository_uri&item_id=896

Terrestrial Isopod Crustaceans from Daito Islands, Southern Japan*

Noboru Nunomura

Toyama Science Museum

1-8-31 Nishinakano-machi, Toyama 939-8084, Japan

南北大東島の陸産等脚目甲殻類

布村 昇

富山市科学博物館

939-8084富山県富山市西中野町1-8-31

南北大東島は沖縄島から東に360km位置する海洋島であり、多くの陸産動物の固有種が報告されている。陸産等脚目についても従来何人かの科学者が他の生物調査の副産物として採取されたものを含めて調査する機会があり、南大東島から3種を記載した。しかし、従来は陸産等脚類を目的にした調査が無かったので、2006年11月筆者自身が調査を行い、富山市科学博物館に収蔵されている標本の一部を併せて調査した。その結果、南北大東島から8種の生息を確認したが、絶壁からなる両島では *Ligia* 属をのぞき海岸に生息種は確認できなかった。また3種が新種であることが判明した。新種として記載したのは *Ligia daitoensis* (ダイトウフナムシ, 新称), *Spherillo ufuagarijimensis* (ウファガリコシビロダンゴムシ, 新称), *Burmoniscus kitadaitoensis* (キタダイトウモリワラジムシ, 新称) である。これらの新種のホロタイプは富山市科学博物館に保管される。

キーワード：大東島, 等脚目, 新種, 分類, ダイトウフナムシ, ウファガリコシビロダンゴムシ, キタダイトウモリワラジムシ

Key words : Daito Islands, Isopoda, new species, taxonomy, *Ligia daitoensis*, *Spherillo ufuagarijimensis*, *Burmoniscus kitadaitoensis*

Daito Islands are located 360 km east of Okinawa Islands (Fig. 1). Hitherto, many endemic animals have been recorded from the islands). As to the terrestrial isopods, several scientists had collected many specimens, together with their destination animals and they were sent to me for study (Nunomura, 1986, 1987, 1990, 2003). But there had been no collecting trip for isopods. Therefore, I made a small collecting trip to Kita-daito Island and Minami-daito Island on November, 2006.

During my stay at the Islands, I collected not a few specimens. I will report the terrestrial isopods, together with some materials deposited at Toyama Science Museum.

At the results of my study, eight species including three new species: *Ligia daitoensis*, *Spherillo ufuagarijimensis* and *Burmoniscus kitadaitoensis* are proved to be new to science. All the type localities of the new species are located at Kita-daito Island.

Family Ligiidae

Ligia daitoensis n.sp.

(Japanese name: Daitô-funamushi, new)

*Contributions from the Toyama Science Museum, No.362

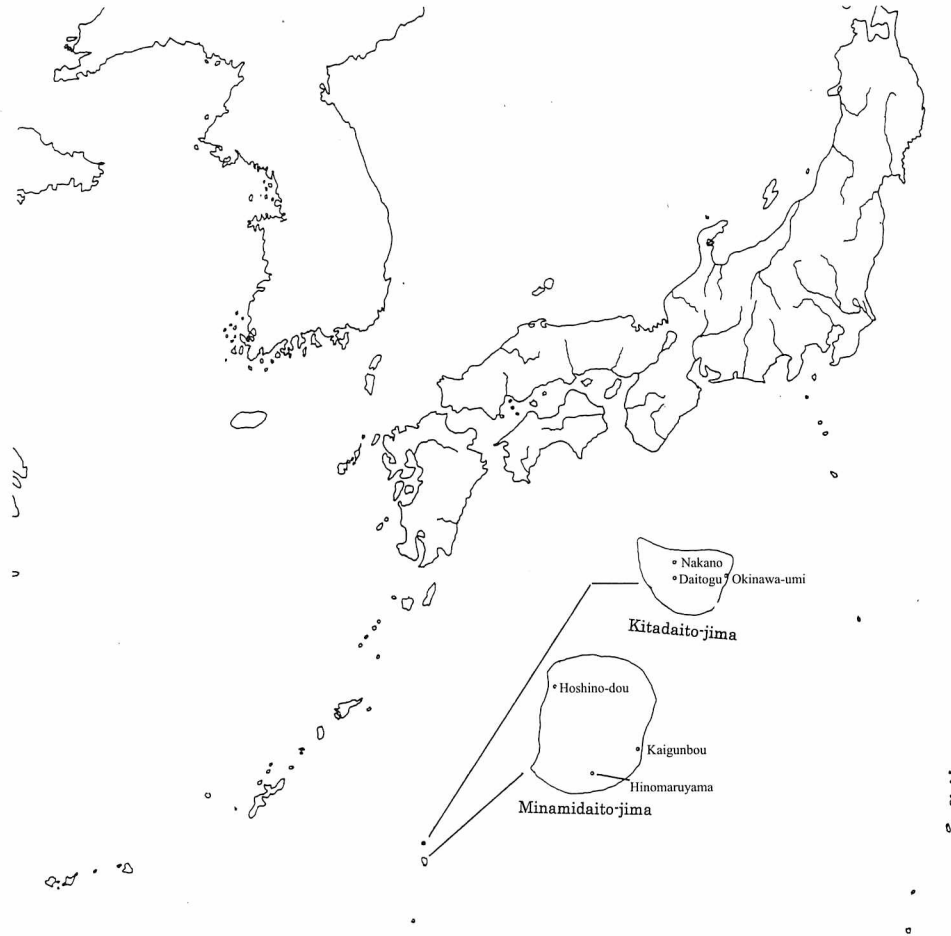


Fig.1 Map of Daito Islands

(fig.2)

Material examined: 2♂♂ (1♂ holotype, 17.1 mm in body length and 1♂ paratype 14.5 mm in body length) and 4♀♀ (1♀ allotype, 18.9 mm in body length, ovigerous 1♀ paratype, 15.9 mm in body length and 2♀♀ paratypes, 13.6 mm-14.5 mm in body length), Okinawa-Umi, Kita-daito Island, Okinawa Pref. Nov., 25, 2006, coll. Noboru Nunomura; 1♀ (paratype, 14.3 mm in body length), Kaigunbou, Minami-daito Islands, Okinawa Pref. Nov., 26, 2006, coll. Noboru Nunomura and 1♀ (paratype, 10.5 mm in body length), Kaigunbou, Minami-daito Islands, Okinawa Aug. 24, coll. Hiroyuki Watanabe. Type series is deposited as follows: Holotype (TOYA Cr-14895), allotype (TOYA Cr-14896) and 2 paratypes (TOYA Cr-14897~14898) at the Toyama Science Museum, 2 paratypes (OMNH Ar-7688) at the Osaka Museum of Natural History, 2 and paratypes (OPM Cr-214~215) at the Okinawa Prefectural Museum.

Description of male: Body 2.7 times as long as wide, except both antennae and uropod. Color grayish brown. Eyes big and reniform, each eye with about 1000 ommatidia. Posterior margin of pleotelson with an obtuse medial angle, and two pairs of relatively shallow dents.

Antennule (Fig. 2B) small and 3-segmented; segment 3 small and semi-circular, with 2 setae and much hair. Antenna (Fig. 2C) extending beyond the posterior end of pleotelson. Mutual length of 5 peduncular segments is 1: 1: 2: 5: 7.5; flagellum with up to 43 segments. Right mandible (Fig. 2D): pars incisiva 3-headed; lacinia mobilis not chitinized and 4-toothed; 16-17 setae; processus molaris wide. Left mandible (Fig. 2E): pars incisiva 2-headed; lacinia mobilis chitinized and 3-toothed; 16-17 setae; processus molaris wide. Maxillula: inner lobe (Fig. 2F) with 4 plumose setae on distal border; outer lobe (Fig. 2G): with 11 teeth, 6 of them serrated. Maxilla normal. Maxilliped (Fig. 2H): endite with about a dozen setae on distal margin and much hair of distal half of lateral margin. Maxillipedal palp composed of perfect five-segments: segment 1 short; segment 2 almost square, with 3 setae on lateral margin and much hair on distal part of inner margin; segment 2, with 2 setae on distal area of outer margin; segment 3 with much hair

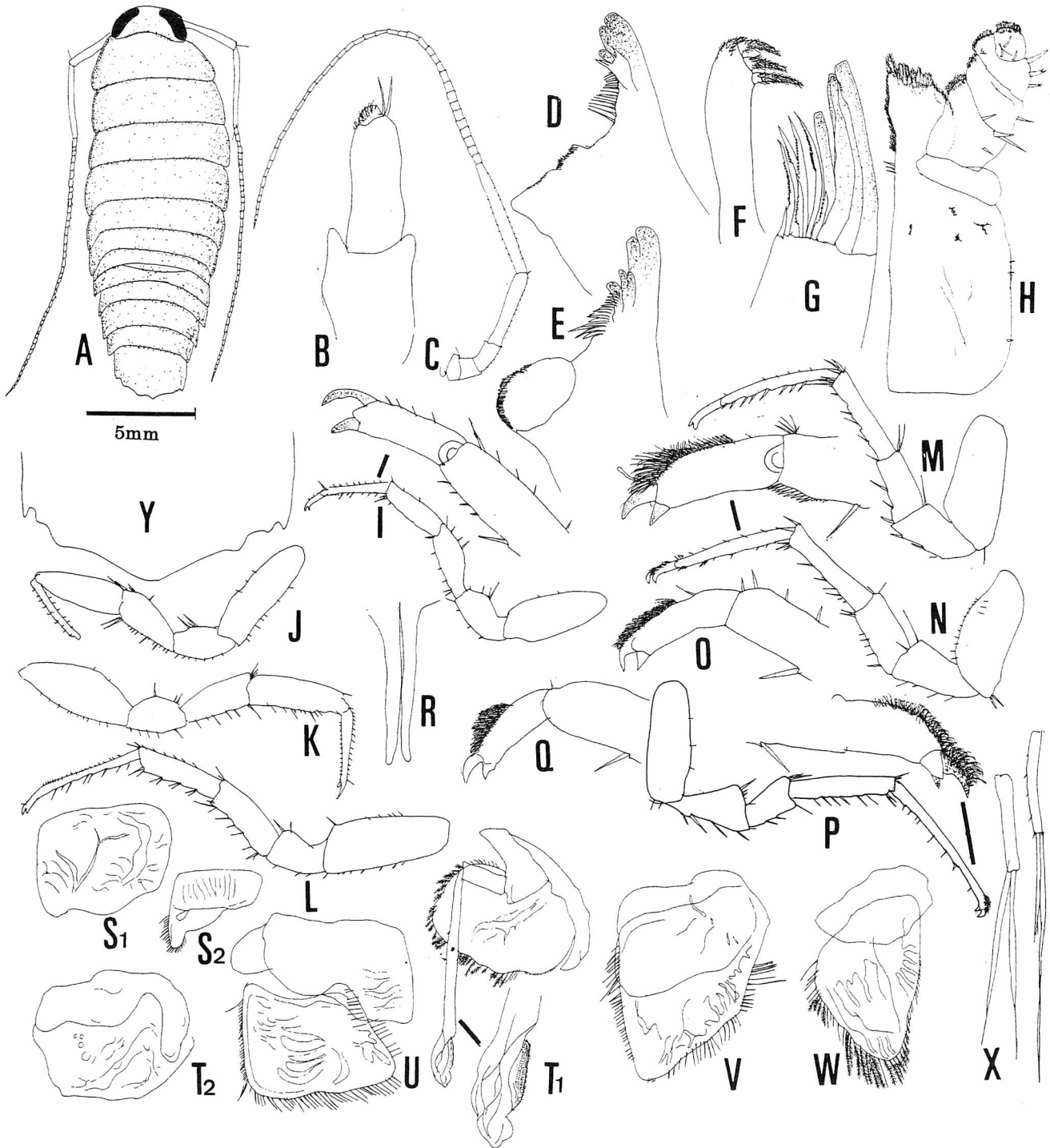


Fig. 2 *Ligia daitoensis* n.sp.

A: Dorsal view; B: Antennule; C: Antenna; D: Right mandible; E: Left mandible; F: inner lobe of maxillula; G: Outer lobe of maxillula; H: Maxilliped; I: Pereopod 1; J: Pereopod 2; K: Pereopod 3; L: Pereopod 4; M: Pereopod 5; N: Pereopod 6; O: Apical part of the same in female; P: Pereopod 7; Q: Apical part of the same in female; R: Penes; S₁: Endopod of pleopod 1; S₂: Exopod of the same; T₁: Male pleopod 2; T₂: Pleopod 2 of female; U: Pleopod 3; V: Pleopod 4; W: Pleopod 5; X (right): Uropod of male; X (left): Same in female; Y: Posterior margin of pleotelson. (A-N, P, R, S, T₁, U-X (right) and Y: Holotype male; O and Q: Female allotype; X (left): Female paratype from Kitadaito).

on inner margin and a seta on outer margin; segment 4 with much hair on inner margin and 3 setae including bifid ones on outer margin; segment 5 round, with much hair on distal area.

Pereopod 1 (Fig. 2I): basis 2.7 times as long as wide; ischium 55% as long as basis, with 4 setae on inner margin and 3-4 setae on outer margins; merus a little longer than ischium, with 6 setae on inner margin and 4 setae on outer margin; carpus as long as merus and lacking cushion-like structure; propodus a little longer than carpus, lacking field of papillae, with 10 setae on inner margin and 10-11 setae on outer margin; dactylus without any projections.

Pereopod 2 (Fig. 2J): basis 3.5 times as long as wide, with 7 setae on inner margin and 4 setae on outer margin; ischium 55% as long as basis, with 7 setae on inner margin and 3-4 setae on outer margin; merus a little longer than ischium, with 15-16 setae including 2 longer distal ones on inner margin and 5-6 setae on outer margin; carpus, stouter than that of pereopod 1; propodus narrow, with 6-10 setae on both margins.

Pereopod 3 (Fig. 2K): basis 2.5 times as long as wide, with about 10 short setae on inner margin and a few short setae on outer margin; ischium rather stout, half the length of basis, with 5 setae on inner margin and 3 setae at outer distal angle; merus 1.2 times longer than ischium, with 6 setae on inner margin and 3 setae at outer distal angle; carpus 1.5 times longer than merus, with about 10 setae on inner margin; propodus as long as merus, with 15-16 short setae on both margins.

Pereopod 4 (Fig. 2L): basis 2.5 times as long as wide; ischium half the length of basis; merus 1.5 times longer than ischium, with 9-12 setae on inner margin and a seta at distal outer angle; carpus a little longer than merus, with 4 groups of 2 setae on inner margin and 8-9 short setae on outer margin; propodus 1.5 times longer than merus, with 8-9 setae on inner margin and about 20 short setae on outer margin.

Pereopod 5 (Fig. 2M): basis 2.4 times as long as wide, with a seta at inner distal angle; ischium 0.6 times as long as basis, with 3 setae on inner margin and 2 setae at outer distal angle; merus 0.8 times as long as ischium, with 3 setae on inner margin and 2 setae at outer distal angle; carpus 1.6 times longer than merus, with 4-5 setae on inner margin and 3-5 setae at outer distal area; propodus 1.3 times longer than carpus, with 8-9 setae on inner margin and 6-7 short setae on outer margin; dactylus without dense hair on outer area.

Pereopod 6 (Fig. 2N): basis 2.4 times as long as wide, with 12-13 short setae on outer margin and 2 setae at inner distal angle; ischium 0.7 times as long as basis, with 4 setae on inner margin and 1-2 setae at outer distal angle; merus 0.8 times as long as ischium, with 5 setae on inner margin, 2 setae at inner distal end and 2 setae at outer distal angle; carpus 1.7 times longer than merus, with 7-8 setae on inner margin and 5-6 setae on distal margin; propodus 1.2 times longer than carpus, with 10-12 setae on inner margin and 8 setae on outer margin; dactylus with a tuft of setae on outer margin.

Pereopod 7 (Fig. 2P): basis 2.9-3.0 times as long as wide, with 1-2 setae at inner distal angle and 3 setae on outer margin; ischium 0.7 times as long as basis, with 4-5 setae on inner margin and 5-6 setae on outer distal area; merus 0.6 times as long as ischium, with 3-6 setae on inner margin and 2-3 setae on outer distal area; carpus 2.2 times longer than merus, with 6-8 setae on inner margin and 2-3 setae at outer distal angle; propodus 1.4 times longer than carpus, with 8-10 setae on inner margin; dactylus with a tuft of setae on outer margin.

Penes (Fig. 2R) paired; each penis 12 times as long as wide.

Pleopod 1 (Fig. 2S₁ and 2): endopod rectangular; exopod ellipse.

Pleopod 2 (Fig. 2T₁): endopod straight but the apical area relatively stout, bearing many rows of minute denticles on inner side; exopod round, with more than 40 setae around the margin.

Pleopod 3 (Fig. 2U): both rami rectangular.

Pleopod 4 (Fig. 2V): and pleopod 5 (Fig. 2): endopod triangular; exopod rectangular.

Uropod (Fig. 2X) a little shorter than the body length: As to the length of both rami of uropods. Length of exopod/ endopod length show variation 0.45-1.0.

Female; roughly as male except sexual characters. Flagellum of antenna with up to 38 segments. Dactylus of pereopod 6 (Fig. 2O): and pereopod 7 (Fig. 2Q) dactylus with a tuft of long setae on outer area as male. Pleopod 2 round (Fig. 2T₂)

Etymology: The species name "Daito" is the name of the islands, the type locality.

Remarks: The present new species is shared to *Ligia hawaiiensis* and *Ligia saipanensis* in having a tuft of setae on dactylus of pleopods 6 and 7 in both sexes. Among them, the present new species is separated from *Ligia hawaiiensis* in the following features: (1) longer apical part of endopod of male pleopod 2, (2) lack of field of papillae on pereopods, (3) lacking protrusion on pereopod 1 and (4) numerous antennal flagellar segments.

The present new species is also allied to *Ligia saipanensis*. But the former is separated from the latter in the following features: (1) longer apical part of endopod of male pleopod 2, (2) longer antennae, (3) deeper concavity of posterior margin of pleotelson, (4) more setose palpal segments of maxilliped, (5) having more strongly serrated teeth on maxillula, (6) tapering penes and (7) longer plumose setae on endopod of maxillula.

Apparently present new species is considered to be related to the following two pacific oceanic species, *L. hawaiiensis* and *saipanensis* in possessing a tuft of thick setae on pereopods 6 and 7 in both sexes.

Family Philosciidae

Papuaphiloscia daitoensis Nunomura, 2003

Papuaphiloscia daitoensis Nunomura, 2003

Material examined: 2♂♂1♀, Apr. 12, 1999, Hoshino-dou, Minami-daito Island coll. Yuji Inagaki. They are deposited at the Toyama Science Museum (TOYA Cr-12920~12921).

Burmoniscus daitoensis (Nunomura, 1986)

Setaphora daitoensis Nunomura, 1985, p. 31, figs. 74-75 (Minami-daito I., Okinawa Pref.).

Material examined: 3♀♀, Daito-jinja, Minamidaito-Island, Okinawa, Aug. 23, 2004, coll. Hiroyuki Watanabe; 2♂♂4♀♀, Hinomaruyama, Minami daito-Island, Okinawa, Nov. 27, 2006. coll. Noboru Nunomura. 2♀♀ near, Higasisuimon, Minamidaito-Island, Okinawa, Nov. 27, 2006. coll. Noboru Nunomura.

Burmoniscus kitadaitoensis n.sp.

(Japanese name: Kitadaitô-mori-warajimushi, new)

(Fig.3)

Material examined: 10♂♂ (1♂ holotype, 6.3 mm in body length and 9♂♂ paratypes, 3.7-7.5 mm in body length) and 25♀♀ (1♀ allotype, 5.9 mm in body length and 24♀♀ paratypes, 3.3 mm-7.7mm in body length), near Daitogu, Kitadaito-Island, Okinawa, Nov. 25, 2006, coll. Noboru Nunomura. Type series is deposited as follows: Holotype (TOYA Cr-14899), allotype (TOYA Cr-14900) and 8 paratypes (TOYA Cr-14901~14908), at the Toyama Science Museum, 8 paratypes (OMNH Ar-7689) at the Osaka Museum of Natural History, 8 paratypes (KMNH IvR 500, 396-500, 403) at the Kitakyushu Museum of Natural History and History, and 8 paratypes (OPM Cr-216~217) at the Okinawa Prefectural Museum. Other specimens: 3♀♀, between Byobuiwa and Koganeyama, Kitadaito-Island, Okinawa, Nov. 25, 2006, coll. Noboru Nunomura.

Description: Body (Fig. 3A) 2.7 times as long as wide. Color brown, with paler irregular patterns. Cephalon ellipse. Eyes big, each eye composed of 30 ommatidia. Pereonal somites almost parallel. Noduli lateralis of pereopods 2-4 remote from lateral border (Fig. 3V). Pleonal somite abruptly narrower than pereonal somite. Terminal pleonal somite triangular.

Antennule (Fig. 3B): segments 1-2 relatively short; terminal segment with 3 aesthetascs on distal half of lateral margin. Antenna (Fig. 3C) long, reaching pereonite 5; mutual length of 3 flagellar segments is 3: 2: 2.

Right mandible (Fig. 3D): pars incisiva 3-headed; lacinia mobilis weakly 2-lobed; processus molaris represented by a single seta. Left mandible (Fig. 3E): pars incisiva 3-headed; lacinia mobilis weakly 2-lobed; processus molaris represented by a single seta. Maxillula (Fig. 3F): outer lobe with 10 relatively short simple setae. Maxilla (Fig. 3G) rectangular, with 3 stout setae. Maxilliped (Fig. 3H): endite with rounded apical margin bearing 3 stout setae; palp rather stout.

Pereopod 1 (Fig. 3I): basis 3.0 times as long as wide; ischium 65% as long as basis, with 4-5 setae on inner margin and 3-4 setae on outer margin; merus almost as long as ischium, with 9-10 setae on inner margin and 3 setae at outer distal angle; carpus 1.4 times longer than merus, 7-8 setae including 3 trifid ones on inner margin and 2 setae

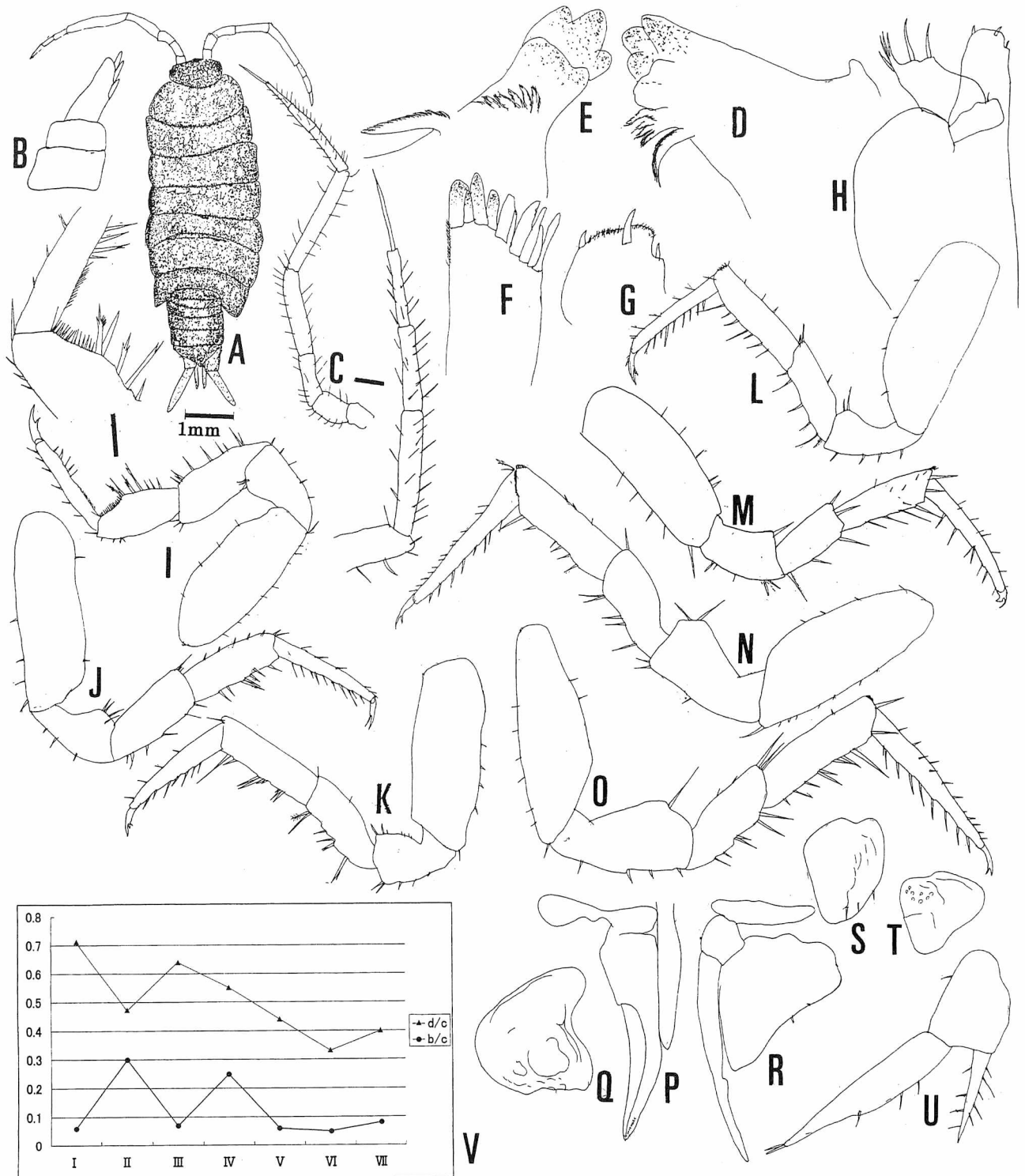


Fig. 3 *Burmoniscus kitadaitoensis* n.sp.

A: Dorsal view; B: Antennule; C: Antenna; D: Right mandible; D : Left mandible; E: Left mandible; F: Outer lobe of maxillula; G: Maxilla; H: Maxilliped; I-O: Pereopods 1-7; P: Penes and endopod of male pleopod 1; Q: Exopod of male pleopod 1; R: male pleopod 2; S: Pleopod 4; T: Pleopod5; U: Uropod; V: Position of noduli lateralis. (All: Holotype male).

on distal margin, distal area of inner margin slightly concave, with many short setae on inner margin; propodus 1.2 times longer than carpus, with many short setae on basal half and 5-6 setae distal half of inner margin, and 6 setae on outer margin.

Pereopod 2 (Fig. 3J): basis 3.0 times as long as wide, with 4-5 setae on inner margin; ischium 45% as long as basis, with 3-4 setae on inner margin and 3-4 setae at outer distal angle; merus almost as long as ischium, with 6-7 setae on inner margin; carpus as long as merus, with 7-10 setae on inner margin; propodus 1.2 times longer than carpus, with 10-11 setae on inner margin and 4-6 setae on outer margin.

Pereopod 3 (Fig. 3K): basis 2.7 times as long as wide, with 5-6 short setae on inner margin; ischium 0.4 times as long as basis, with 5-6 setae on inner margin; merus as long as ischium with 5-6 setae including 1-2 bifid ones and a plumose one; carpus 1.3 times longer than merus, with 3 groups of 2-4 setae on inner margin; propodus a little longer than carpus, with 7-8 setae on inner margin and 4 setae on outer margin.

Pereopod 4 (Fig. 3L): basis 2.3 times as long as wide; ischium 0.4 times as long as basis, with 4-5 setae on inner margin and 2 setae on outer distal area; merus as long as ischium, with 6-7 setae on inner margin and 2-3 setae on outer margin; carpus 1.5 times longer than merus, with 7-8 setae on inner margin and 3-6 setae on outer margin; propodus as long as carpus, with 9 setae on inner margin and 6-8 setae on outer margin.

Pereopod 5 (Fig. 3M): basis 2.7 times as long as wide, with 5 setae on both margins; ischium half the length of basis, with 5 setae on inner margin and a seta at outer distal angle; merus a little shorter than ischium, with 3 setae on inner margin and 3 setae on distal margin; carpus 1.3 times longer than merus, with 4-5 setae on inner margin and 2 setae on distal margin; propodus 1.4 times longer than carpus, with 7-8 setae on both margins.

Pereopod 6 (Fig. 3N): basis 2.6 times as long as wide, with 7-8 short setae on inner margin, 4-5 setae on outer margin and a seta at inner distal angle; ischium 55% as long as basis, with 3 setae on inner margin and 2 setae on outer margin; merus 0.8 times as long as ischium, with 5 setae on inner margin and a seta at outer distal angle; carpus 1.3 times longer than merus, with 6 setae on inner margin; propodus 1.2 times longer than carpus, with 8 setae on inner margin and 13-15 setae on outer margin.

Pereopod 7 (Fig. 3O): basis 2.6 times as long as wide, with 6-8 short setae on inner margin; ischium 65% as long as basis, with 4-5 setae on inner margin and a seta on outer margin; merus 2/3 as long as ischium, with 6 setae on inner margin and 2 setae at outer distal angle; carpus 1.4 times longer than merus, with 8-9 setae on inner margin; propodus 1.3 times longer than carpus, with 9-10 setae on inner margin and 12-14 setae on outer margin.

Penes (Fig. 3P): narrow- lanceolate.

Pleopod 1 (Fig. 3P and Q): endopod relatively stout, bending outwards, with more than 10 denticles; exopod semi-circular. Pleopod 2 (Fig. 3R): endopod straight; exopod triangular, with a seta on distal margin. Pleopod 3: rounded triangular, with 4 spines on distal margin. Pleopod 4 (Fig. 3S): rounded triangular, with 3 setae. Pleopod 5 (Fig. 3T): round.

Uropod (Fig. 3U) 0.2 times as long as body length; endopod slender, and almost as long as basis; exopod twice longer than endopod.

Female: Roughly same as male except sexual character.

Etymology: The species name refers Kitadaito Islands.

Remarks: The present new species is most closely allied to *Burmoniscus daitoensis* recorded from Minami-daito, but the former is separated from the latter in the following features: (1) simple all the teeth on outer lobe of maxillula, (2) lack of lappet - like structure on stylus of male second pleopod, (3) presence of bifid and trifid type setae on pereopod 1, (4) shape of postero-lateral angle of pereonal somite 7, (5) remoter position of noduli lateralis on pereonal somite 4 and (6) narrower penes.

The present new species is separated from *Burmoniscus okinawaensis* recorded from Okinawa Island and other wider areas in the following features: (1) simple all the teeth on outer lobe of maxillula, (2) lack of lappet - like structure on stylus of male second pleopod, (3) presence of bifid and trifid type setae on pereopod 1, (4) longer exopod of uropod and (5) remoter position of noduli lateralis on pereonal somite 4.

Family Armadillidae

***Spherillo daitoensis* (Nunomura, 1990)**

Spherillo daitoensis Nunomura, 1990, p. 17, fig. 145 (forest of *Livistona subglobosa*, Hinomaru-yama, Minami-daito-jima Is, Okinawa Pref.).

Material examined: 1♂3♀♀, Daito-jinja, Minamidaito-Island, Okinawa, Aug. 23, 2004, coll. Hiroyuki Watanabe; 1♂4♀♀, north of Hoshino-do, Minami-daito Island, Okinawa, Nov. 27, 2006, coll. Noboru Nunomura.

***Spherillo ufuagarijimensis* n.sp.**

(Japanese name: Ufuagari-koshibiro-dangomsuhi, new)

(Fig. 4)

Material examined: 15♂♂ (1♂ holotype, 5.2 mm in body length, 14♂♂ paratypes, 3.2-5.6 mm in body length) and 21♀♀ (1♀ allotype, 5.5 mm in body length and 20♀♀ paratypes, 4.1-5.5 mm in body length), Nakano, Kitadaito-Island, Okinawa, Nov. 25, 2006, coll. Noboru Nunomura. Type series is deposited as follows: Holotype (TOYA Cr-15955), allotype (TOYA Cr-15956) and 10 paratypes (TOYA Cr-15957~15966) at the Toyama Science Museum, 8 paratypes (OMNH Ar-7690) at the Osaka Museum of Natural History, 8 paratypes (KMNH IvR 500, 404-500, 411) at the Kitakyushu Museum of Natural History and History, and 8 paratypes (OPM Cr-218~219) at the Okinawa Prefectural Museum. Other specimens: 3♀♀, between Byobu-iwa and Koganeyama, Kitadaito, Okinawa, Nov. 26, 2006, coll. Noboru Nunomura; 1♀, Daitougu. East of Hokusen-dou, Kitadaito-Island, Okinawa. Nov. 26, 2006, coll. Noboru Nunomura; 1♂2♀♀, near Hokusen-dou, Nov. 26, 2006, coll. Noboru Nunomura.

Description: Body (Fig. 4A) 2.1 times as long as wide. Color blackish-brown, but all the pereonal somites with a pair of large irregular paler patterns. Anterior margin of cephalon slightly arched. Eyes mediocre in size and each eye composed of 12 ommatidia. Ventral area of pereonal somite 1 (Fig. 4B) with a pair of schisma. Ventral area of pereonal somite 2 with a pair of teeth. Pleotelson hour-grass-shaped (Fig. 4V).

Antennule (Fig. 4C): segment 2 short; terminal segments with 3 aesthetascs. Antenna (Fig. 4D): peduncular segments 2-4 subequal in length; fifth peduncular segment 1.7 times longer than the fourth. Flagellar segments 2/3 as long as the 5th terminal segment; terminal segment of flagellum 2.8 times longer than the basal one.

Right mandible (Fig. 4E): pars incisiva with 2 teeth; lacinia mobilis with 2 weak teeth; 12 setae; 12-14 setae; processus molaris represented by single setae. Left mandible (Fig. 4F): pars incisiva with 4 teeth; lacinia mobilis with 3 teeth; processus molaris represented by single short setae. Maxillula (Fig. 4G): inner lobe with 2 plumose setae; outer lobe with 10 simple setae. Maxilla (Fig. 4H): rectangular. Maxilliped (Fig. 4I): endite rectangular, with 4 stout setae on distal area; palp relatively slender.

Pereopod 1 (Fig. 4J): basis oblong, 3.5 times as long as wide; ischium 0.4 times as long as wide; merus 0.3 times as long as basis, with more than 10 setae including a bifid one on inner margin and a seta at outer distal angle; carpus 1.3 times longer than merus, with more than 12 setae including a trifurcate and 2 bifid one on inner margin; propodus 0.6 times as long as carpus, with a series of about a dozen short setae on basal part and 2 setae including a trifurcate one on distal half of inner margin.

Pereopod 2 (Fig. 4K): basis 4.2 times as long as wide; ischium 0.45 times as long as basis; merus 0.6 times as long as ischium, with 9 setae on inner margin; carpus 1.7 times as long as merus, with more than 10 setae on including 2-5 longer trifurcate ones; propodus 0.8 times as long as carpus, with 2 longer trifurcate and several shorter setae on inner margin.

Pereopod 3 (Fig. 4L): basis 4.0 times as long as wide; ischium half the length of basis, with 8-9 short setae on inner margin; merus 0.7 times as long as ischium, with 4-5 setae including a trifid ones on inner margin; carpus 1.4 times longer than merus, with 7-8 setae including 5-6 bifid or trifid ones on inner margin; propodus as long as carpus, with 3 setae on inner margin and 6-8 short setae on outer margin.

Pereopod 4 (Fig. 4M): basis 4.2 times as long as wide; ischium 0.4 times as long as basis, with 4-5 setae on inner margin; merus a little shorter than ischium, with 4 setae on inner margin; carpus 1.1 times longer than merus,

with 5-6 setae including 2 bifid or trifid ones on inner margin; propodus, a little longer than carpus, with 5 setae on inner margin and 10-12 short setae on outer margin.

Pereopod 5 (Fig. 4N): basis 4.5 times as long as wide; ischium half the length of basis, with 4-5 setae on outer margin; merus 0.7 times as long as ischium, with 4-6 setae on both margins; carpus as long as ischium, with 4 setae on inner margin and 2 setae at inner distal angle; propodus as long as carpus, with 7-8 setae including bifid ones on inner margin.

Pereopod 6 (Fig. 4O): basis 3.3 times as long as wide; ischium half the length of basis; merus 0.6 times as long

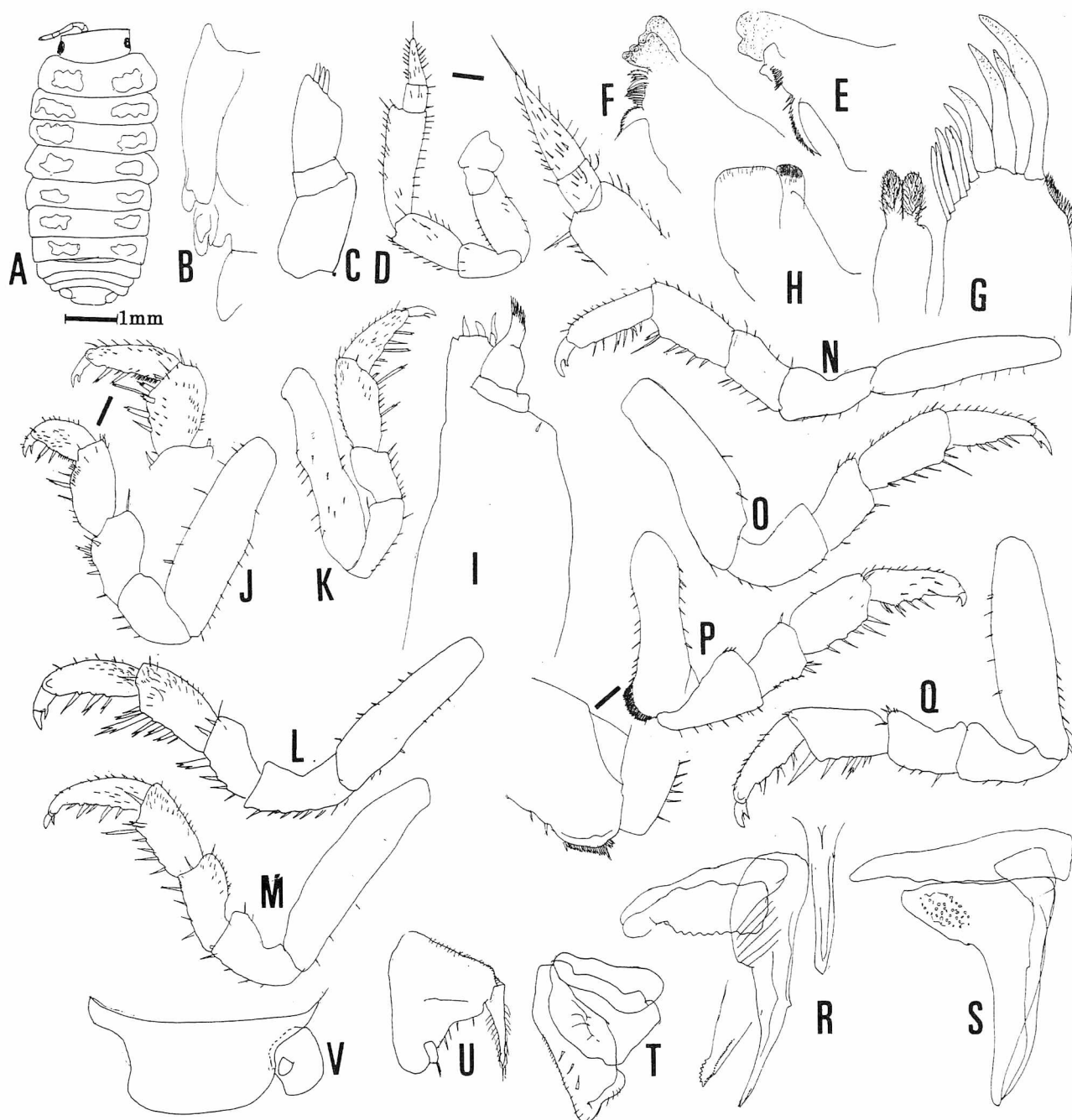


Fig. 4 *Spherillo ufuagarijimensis* n.sp.

A: Dorsal view; B: Ventral view of pereon somites 1-2; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J-P: Pereopods 1-7 in male; Q: Pereopod 7 in female; R: Penes and male pleopod 1; S: Male pleopod 2; T: Pleopod 5; U: Uropod; V: Pleotelson and uropod (A-P, R-V: Holotype male; Q: Allotype female).

as ischium, with 5-6 setae on inner margin; carpus 1.6 times longer than merus, with 7-8 setae on inner margin and 12-13 short setae on outer margin; propodus a little shorter than carpus, with 5 setae on inner margin and 10-12 short setae on outer margin.

Pereopod 7 (Fig. 4P): basis 3.5 times as long as wide, inner basal part flatly protruded, bearing many short setae; ischium 0.6 times as long as basis; merus 0.3 times as long as basis; carpus 1.6 times longer than merus, with 5-6 relatively long setae on inner margin; propodus almost as long as carpus, with 7-8 setae on inner margin and 11-12 short setae on outer margin.

Penes (Fig. 4R): narrow- lanceolate. Pleopod 1 (Fig. 4R): endopod straight, with sinuate area and a row of more than 30 small denticles on apical area; exopod rectangular, 1/3 as long as wide, with sinuate outer margin. Pleopod 2 (Fig. 4S): endopod straight, a little shorter than exopod. Pleopod 5 (Fig. 4T): both rami rectangular.

Uropod (Fig. 4U): basis triangular, endopod narrow, tapering toward the tip and bearing many setae on both margins; exopod small and rectangular.

Female: Roughly same to male except for copulatory apparatus and absence of protruded area on basis of pereopod 7 (Fig. 4Q).

Etymology: “Ufuagari” means Daito Islands in Okinawa dialect. The Island is located in east direction from Okinawa.

Remarks: The present new species is most closely allied to the another daito species *Spherillo daitoensis*, but the former is separated from the latter in the following features: (1) paler body color, (2) protruded inner distal part with thick setae on male pereopod 7, (3) sinuate distal margin of endopod of male pleopod 1, (4) less numerous setae on antennule, (5) wider exopod of male pleopod 1 and (6) shorter terminal flagellar segment of antenna.

The present new species is also allied to *Spherillo shuriensis*, recorded from Okinawa Island, but the former is separated from the latter in the following features: (1) protruded inner distal part with thick setae on male pereopod 7 (2) sinuate outer margin of exopod of male pleopod 1, (3) sinuate distal margin of endopod of male pleopod 1, (4) shorter endopod of male pleopod 2, (5) presence of bifid and trifid setae on pereopods, (6) shorter pleotelson and (7) shorter terminal flagellar segment of antenna.

Family Porcellionidae

Porcellionides pruinosus (Brandt, 1833)

Porcellio pruinosus Brandt, 1833, p. 181.

Metoponorthus pruinosus, Hilgendorf, 1893a.

Material examined: 1♂2♀♀, Minato, Kitadaito-Island, Okinawa, Nov. 24, 2006, coll. Noboru Nunomura; 2♀♀, Okinawaumi, Kitadaito-Island, Okinawa, Nov. 25, 2006, coll. Noboru Nunomura; 1♀, between Byouiwa and Koganeyama, Kitadaito-Island, Okinawa, Nov. 25, 2006; 1♀, Ooike, Minamidaito-Island, Okinawa, Aug. 23, 2004, coll. Hiroyuki Watanabe; 5♂♂4♀♀, Zaisho, Minamidaito-Island, Okinawa, Nov. 27, 2006. coll. Noboru Nunomura.

Agabiformis lentus (Budde-Lund, 1885)

(Fig.5)

Agabiformis lentus (Budde-Lund, 1885)

Leptotrichus chobihige Nunomura, 1992 p. 17, fig. 186 (at Ishigaki I., Okinawa).

Leptotrichus fuscatus (Iwamoto, 1943) p. fig.

Porcellio fuscatus Iwamoto, 1943, p. 27, no. 8, figs. 17-18.

For further synonymy, see for example, Schmalfuss (2003).

Material examined: 3♂♂3♀♀ (up to 4.5 mm in body length), Nakano, Kitadaito-Island, Okinawa Nov, 25, 2006, coll. Noboru Nunomura.

Description: Body 1.8 times as long as wide. Color blackish-brown but all the pereonal somites with a pair of large irregular paler patters. Antero-lateral area of cephalon slightly protruded and media process slightly raised (Fig.

5B). Pleotelson triangular.

Antennule (Fig. 5C): segment 2 short; terminal segment with 10 aesthetascs. Antenna (Fig. 5D) relatively short; terminal flagellar segment 2.5 times longer than the basal one.

Right mandible (Fig. 5E): pars incisiva 2-headed; lacinia mobilis weakly two-lobed; processus molaris represented by a tuft of setae. Left mandible (Fig. 2F): pars incisiva 2-headed; lacinia mobilis weakly two-lobed; processus molaris represented by a tuft of setae. Maxillula (Fig. 5G): inner lobe with 2 relatively short plumose setae and a short seta on inner margin; outer margin 10 simple setae; Maxilla (Fig. 5H): normal. Maxilliped (Fig. 5I): endite with 3 setae on distal margin, alp relatively stout.

Pereopod 1 (Fig. 5J): basis 3.2 times as long as wide; ischium half the length of basis; merus 0.6 times as long

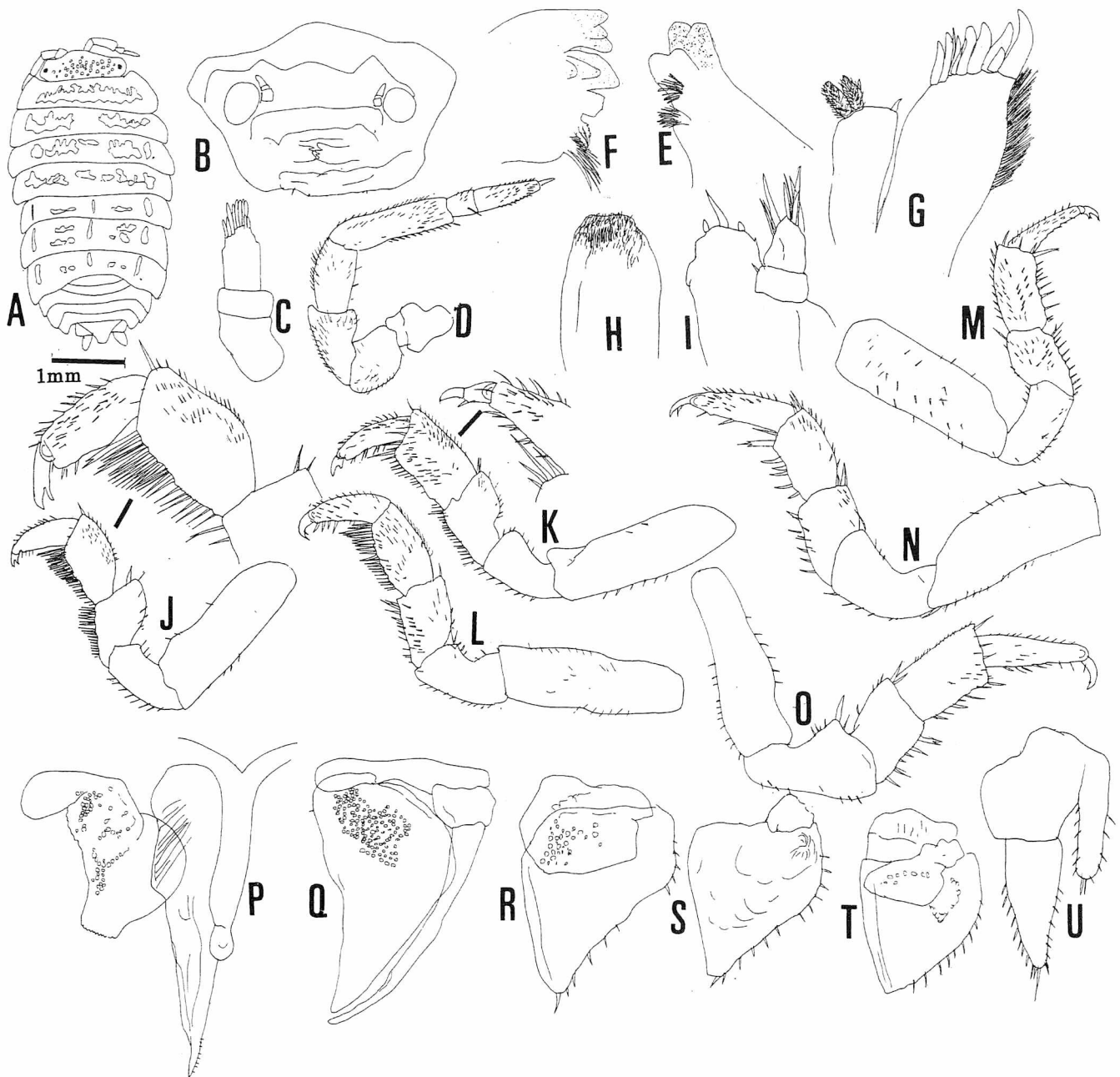


Fig. 5 *Agabiformis lentus* (Budde-Lund, 1885)

A: Dorsal view; B: Frontal view of cephalon; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J-M: Pereopods 1-4; N-O: Pereopods 6-7; O: Penes and Pleopod 1; Q-S: Pleopods 2-5; T: Uropod (All: Male from Kitadaito).

as ischium, with many setae on inner margin; carpus 1.5 times longer than merus, with many long setae including several bifid ones; propodus 0.8 times longer than carpus.

Pereopod 2 (Fig. 5K): basis 3.2 times as long as wide, with 5-6 setae on inner margin; ischium 0.4 times as long as basis; merus a little shorter than ischium, with many setae on inner margin; carpus 1.3 times longer than merus, with many setae on inner margin; propodus as long as merus, with 7-8 setae on inner margin.

Pereopod 3 (Fig. 5L): basis 3.1 times as long as wide; ischium 45% as long as basis; merus 0.8 times as long as ischium, with many setae on inner margin; carpus 1.2 times longer than merus, with many setae on inner margin; propodus as long as carpus, with 6-8 setae on inner margin.

Pereopod 4 (Fig. 5M): basis 2.8 times as long as wide, ischium 45% as long as basis, with; merus 65% as long as ischium, with 10-11 setae on inner margin; carpus, a little longer than merus, with 11-12 setae on inner margin and 3 setae on distal margin; propodus as long as carpus. Pereopod 5 roughly similar to pereopod 4.

Pereopod 6 (Fig. 5N): basis 2.6 times as long as wide; ischium 0.55 times as long as basis; merus 0.8 times as long as ischium, with 7-8 setae on inner margin; carpus 1.2 times longer than merus, with 6-7 setae on inner margin; propodus 1.3 times longer than carpus, with 2-3 setae on inner margin.

Pereopod 7 (Fig. 5O): basis 3.5 times as long as wide; ischium 0.7 times as long as basis, with a strong seta at outer distal angle; merus half the length of ischium, with 7-8 setae on inner margin; carpus 1.5 times longer than merus, with 8-10 setae on inner margin; propodus a little longer than carpus, with 8 setae on inner margin and about a dozen short setae on outer margin.

Penes (Fig. 5P): narrow-lanceolate. Pleopod 1 (Fig. 5P): endopod straight and tapering toward the tip bearing about a dozen small denticles; exopod with transverse but slightly dentate distal margin. Pleopod 2 (Fig. 5Q): endopod only a little beyond the tip of exopod; exopod triangular. Pleopod 3 (Fig. 5R): endopod triangular, with 10-12 setae on outer margin; exopod rectangular. Pleopod 4 (Fig. 5S): endopod triangular, with 12 setae on outer margin. Pleopod 5 (Fig. 5T): endopod triangular, with 10 setae on outer margin.

Uropod (Fig. 5U): basis almost square endopod lanceolate; exopod narrower than endopod.

Female: Roughly same to male except sexual characters.

Remarks: As Schmalfuss (2003) pointed out, two Japanese species, *Leptotrichus fuscatus* (Iwamoto, 1943) and *Leptotrichus chobihige* (Nunomura, 1992) are considered to be a junior-synonym of the present species. But the specimens from Daito has some little differences from the separated from description on European specimens in the following features: (1) smaller anterolateral lappet of cephalon, (2) lack of spine on exopod of male pleopod 1 and (3) less protruded postero-lateral angle of peronite 7.

Acknowledgements

I wish to express my sincere gratitude to Dr. Hiroyuki Watanabe, Prof. Emeritus for his kindness in collecting *Ligia* specimen from Minami Daito Island.

References

- Budde-Lund, G., 1885. Crustacea Isopoda terrestrial per familias et genera et species descripta: 1-319.
- Dana, J. D., 1853 Crustacea. Part II. In: C. Wilkes, United States Exploring Expedition, 1838- 1842 under the command of Charles Wilkes. 14:1618 pages. Philadelphia.
- Edmondson, C. H., 1931. New Hawaiian Crustacea. *Occasional Papers of the Bernice Bishop Museum* 9(10):1-18.
- Iwamoto, K., 1943. "Some Terrestrial Isopoda from Japan". *Dobutsu oyobi Shokubutsu*. 11 (1n Japanese).
- Nunomura, N., 1979. *Ligia boninensis*, a new isopod crustacean from Haha-jima, Bonin Islands, Japan. *Bull. Toyama Sci. Mus.*, 1: 37-40.
- Nunomura, N., 1983. Studies on the terrestrial isopod crustaceans in Japan I. Taxonomy of the families Ligiidae, Trichoniscidae and Olbrinidae. *Bull. Toyama Sci. Mus.*, 5: 23-68.
- Nunomura, N., 1986. Studies on the terrestrial isopod crustaceans in Japan III. Taxonomy of the families Scyphacidae

- (continued), Marinoniscidae, Halophilosciidae, Philosciidae and Oniscidae. *Bull. Toyama Sci. Mus.*, 9: 1-72.
- Nunomura, N., 1987. Studies on the terrestrial isopod crustaceans in Japan IV. Taxonomy of the families Trachelipidae and Porcellionidae. *Bull. Toyama Sci. Mus.*, 11; 1-76.
- Nunomura, N., 1990. Studies on the terrestrial isopod crustaceans in Japan V. Taxonomy of the families Armadillidiidae, Armadillidae and Tylidae, with taxonomic supplements to some other families. *Bull. Toyama Sci. Mus.*, 13: 1-58.
- Nunomura, N., 1992. Studies on the terrestrial isopod crustaceans in Japan VII. Supplements to the taxonomy-3. *Bull. Toyama Sci. Mus.*, 15(20): 1-23.
- Nunomura, N., 1999. Sea shore isopod crustaceans collected from Izu Islands, Middle Japan. *Bull. Toyama Sci. Mus.*, 22 ; 7-38.
- Nunomura, N., 2001. Terrestrial Isopod Crustacean from Saipan Northern Marianna. *Bull. Toyama Sci. Mus.*, 24; 1-17.
- Nunomura, N., 2003. New species of the genus *Papulphiloscia* (Crustacea: Isopoda: Philosciidae) from Minami Daito Island, Southern Japan *Bull. Toyama Sci. Mus.*, 26 : 1-4.
- Nunomura, 2007. Terrestrial Isopods from Hachijo Island, middle Japan. *Bull. Toyama Sci. Mus.*, (30):17-36.
- Schmalfuss, H., 2003. World Catalog of terrestrial isopod (Isopods: Oniscidea) Stuttgarter Beitr. Naturk Ser. A654: 1 -341.
- Taiti, S., M. L. Arnedo, S. L. Lew and G. K. Roderick, 2003. Evolution of territoriality in Hawaiian species of the Genus *Ligia* (Isopoda, Oniscidea) In: *Sfenthourakis (ed). Biology of terrestrial Isopoda* v: 85-102. koninklijke Brill NV, Leiden.
- Taiti, S. & F. Ferrara., 1991. Terrestrial Isopod (Crustacea) from the Hawaiian island. *Bishop. Mus Occ. pap.* 31:202-227.
- Vandel, A., 1960. Isopodes terrestres Premiere partie. *Fauna de France* 64: 1-410.